REPORT ON EXPERIMENTAL WORK WITH JOAN HIGGINS.

Robert H. Gault.

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REPORT ON EXPERIMENTAL WORK WITH JOAN HIGGINS

(October 6, 1936 to May 28, 1937)

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The life of a young child who is as physically handicapped as Joan is as complex as that of any other. All her abilities and activities are closely interrelated and can never be described as single units. But for the sake of clarity, this account has divided Joan's development into several general units, although no such unit may be considered complete unless it is seen in its relation to other phases of Joan's life. Moreover, such a subject as Joan's use of her hands is, of necessity, discussed in connection with a great variety of activities and, to avoid repetition, is not treated separately. So, for the reader's convenience, in the first portion of this report, references have been placed in parentheses to localize the most important data concerning single units of development. (Sleep is discussed, for instance, under A1, and whenever further factors influencing sleep are mentioned, A1 is placed in the text.)

PART I

October 6, 1936 to January 31, 1937

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A. IMPROVEMENT IN PHYSICAL HEALTH

Joan Higgins is a robust, well-built child. In December, 1936, at an age of 5 yrs. (no months), she weighed 42 lbs. and her standing height is approximately 41 in. (or 3 ft. 5 in.). Her physical energy and muscular strength (particularly in her hands) seems well above average, although it is hard to compare her with normal children who are constantly active and who find new and absorbing interests every hour of the day. She is exercised daily (as described under Motor Development and Play Activities), but until she has learned ways of exercising herself, it will be impossible for her to use all of the physical energy that she should. She has had two colds this winter, the first early in November, and the second during the middle of January when other members of the family were suffering from influenza. The discharge from her eyes and ears, although variable, seems to be generally decreasing. The Illinois Children's Home and Aid Society provides her with physical examinations once every three months.

1. Sleep. Joan is at her best after 11 to 12 hours of sleep per night, and with much less than that amount she is tired and irritable during the day. Regulating her rest was one of the most baffling problems of her training because so many factors seemed involved. When she came to Evanston, Joan had an unhealthy habit of exciting herself by rocking forward and back when in a sitting position. And it was discovered that when she wakened at night she filled the hours in this way, thus completely upsetting her nervous system for even so much as several days following. As a result, and also because her eating habits and the general lack of body fatigue, she slept, during October and November, on an average of 4 to 7 hours per night, and frequently, members of the family were forced to exercise or coddle her for one or two hours in the late evening or very early morning. For one period of two weeks, the first floor of the house was vacant, and during this time Joan was pinned under her blankets, loosely, but so that she could not sit up, and was allowed to cry as much as she wished. This, and constant care throughout the day, finally cured her of the rocking habit, and she soon learned not to expect unnecessary attention during the night.

About the same time, it was observed that Joan slept best after she had been mentally as well as physically fatigued. So during the Christmas holidays, this hypothesis was tested and proved as members of the family made occasional use of the Gault-Phonotactor. During the month of January, instruction has been arranged so as to give Joan both mental and physical activity each day, and for an hour on Saturdays and Sundays, Mrs. Larsen continues working with the Phonotactor toward this end.

During December, Mrs. Larsen kept a record of the nights on which Joan slept 7 hours or more, and found that there were only fifteen nights (or only 50 per cent of the total) when the child had barely enough rest. In January, the exact number of hours of each night's sleep was recorded, with the following results.

Day of month	*Hours of sleep*
1	10½
2	10
3	6
4	4½
5	3
6	5
7	5½
(this rate continuing until)	
15	7
16	7
17	11
18	10½
19-22	11
23	12
24	12½
25	11
26	10½
27	11½
28	10
29	9½
30	10½

On the days from January 4th to 8th, and again on Monday, January 11th, newspaper reporters and photographers came to the house once or twice each day. Although these people were very friendly to Joan and cooperated in the effort not to excite her, the unaccustomed confusion upset the child and she slept badly and was irritable throughout the week. The last half of the month, however, brought her best sleep record since early November, and since July, 1936, she has had only two one-week periods of similar rest.

2. *Elimination.* In the fall, urination occurred every 20 to 30 minutes, and Joan's accidents were frequent. It gradually became evident, however, that if she slept throughout the night she remained dry until morning; and again, she remained dry during the day for longer periods as her interest in some activity was sustained. At first it was necessary, through timing and constant observation, to try to forestall any such accidents. But slowly, as Joan learned the location of the bathroom and as her understanding of the imposed toilet habits increased, she learned to indicate her need to void, and to control herself to such an extent that during the past month accidents have been comparatively rare. At present urination occurs every hour or so, with influencing factors of sleep, variety of activities, and intensity of interests.

To date, it has been impossible to regulate Joan's stools. They are abnormal and occur with excessive frequency. There are probably psychological factors influencing the normal processes of digestion and excretion, as well as the physical elements, and these must be determined as ways are found of withdrawing her attention from herself.

B. MOTOR DEVELOPMENT

Joan's motor development has shown rapid and spectacular progress in the past four months. The child who, today, wanders through the house feeling and learning about the objects in her environment, seeking new sources of vibration and amusement, who laughs at the unexpected and is constantly striving toward better methods of communication, little resembles the Joan of October who was content to rock quietly for hours at a time, who vigorously rejected unfamiliar objects, and who was wholly dependent upon the initiative of others for any variety in her daily activities. She has developed considerable poise, comparatively speaking, her general posture and limb-movements have lost much of the grotesque motion that was undirected and superfluous. She also shows greater freedom in her movements, as the haunting fear and insecurity which characterized her early attitude have diminished and as her motor skill has improved.

An interesting observation was made recently when the experimenter bent forward so as to hold Joan upside down. She had never enjoyed this position, but on this occasion she laughed delightedly. It did not take long to discover that the experimenter had happened to place her hands under Joan's head, and when this support was removed Joan's smile disappeared. It is presumed that her neck muscles are undeveloped because she does not move her head and exercise them as much as a seeing child does.

1. Locomotion. By October, Joan had learned to walk alone, using the heel and ball of her foot more than she had during the summer instruction; but, still unable to control the exact position of her feet, she frequently stepped on the outer edge of her foot, or dragged one at a right angle to the other, her body turned slightly sideways. Her walk lacked the rhythmic ease and steadiness that results from purpose and sureness of direction; and although she remained standing when left alone, she never moved without guidance and encouragement.

During the month of October, Joan was taken for a walk almost every day, (A) around one or two blocks, as her mood permitted. Sometimes she was in high spirits, walking steadily and running, by leaning forward and supporting her weight with both hands as she clutched her companion's fingers. (In an attempt to help Joan to run in an upright, self-supporting position, a game was devised in which two instructors, each taking one of Joan's hands, ran with her a few steps and then lifted and swung her through the air. This she enjoyed tremendously, and some progress seems to have been made. Joan can run several steps by herself when she wants to.) At other times, she was listless and demanded constant urging and direction. Frequently, she would lean away back and let herself be pulled along, or would sit down suddenly again and again, perfectly content to remain on the sidewalk indefinitely.

In November, Joan took an immediate dislike to cold weather. The novelty had, by then, worn off of her ability to go up and down stairs, and she made the steps slowly, leaning against the railing until the experimenter pulled on her coat and then she made the next step grudgingly. Usually about half way downstairs she started crying, and continued forcing the tears, stamping her feet, and slapping or biting at the experimenter's hand throughout the walk; and twice it was necessary to carry her home. Finally the walks were discontinued until some warm days late in January. At that time, great improvement was observed in Joan's carriage, and in her control of her feet. She even ran occasionally on her own initiative, holding the instructor by one hand for guidance. When going upstairs, she faced forward, instead of turning around and ascending backwards as had been her method in November.

Apparently, Joan is quite capable of walking, running, going up and down stairs, and even jumping normally, although greater steadiness and grace would be achieved with practice. It is possible that a general lack of motivation and knowledge of the situation accounts for unskilled performance. But it should be noted that she has recently learned to hold her hands out in front of her when walking alone, and in this way she is developing greater assurance in her environment and familiarity with it. (B3)

Throughout the experimental work, various physical exercises have been invented, partly for the muscular exertion resulting, and partly as a basis for communicating to Joan the concept of language through the association of certain activities with specific vocalizations. Thus, two methods of jumping have been employed: one in which Joan, holding the experimenter's hands, jumps, either without assistance (except for localization), or by using her arm muscles for body rigidity as she is lifted up each time with only an initial push as her knees straighten; or a second method in which the experimenter, standing behind Joan, places her hands under Joan's arms and jumps with her. Likewise, swinging from one foot to the other may occur either backward and forward or from side to side.

2. *Rhythmic Appreciation.* One of the first observations of almost everyone who meets Joan concerns the daintiness with which she uses her feet and the lightness of her body. Indication of an innate appreciation of rhythm have been evident to those who have worked with Joan for any length of time. When rocking, the rapidity with which she adjusted herself to various speeds was observable at an early date, and later, further evidence of easy adjustment to tempo was discernable. For one short period (about the middle of December), Joan thought it great fun to ride upon the experimenter's toes, and the facility with which she balanced herself for steps of varying size and speed was marked. (Usually by the second step she had adapted herself to the new rhythm. This activity was supplanted by the side-to-side swing, in which combinations of tempos are sometimes used. Hence, two long steps may be followed by three short ones, and the series is then repeated. Further development is necessary in muscular control and in Joan's perception of rhythmic units, as such; but one ambition for the future is to have her learn to walk or swing alone to rhythmic patterns which she has previously received by means of the drum or phonotactor.

3. Manual Development (See, also, Sense-training Activities).

Eating. During the summer great progress had been made in Joan's eating habits, and when we began work in October, she would permit her spoon to be held in her hand, and had lost much of her violence in throwing away the food that she could not stuff immediately into her mouth, kicking and banging on the table, and dropping her glass. But her mouthfuls were still too large, she frequently swallowed her food without chewing it, and she refused to hold a glass or spoon in her hand alone, except on rare occasions. (C6, A)

In the past four months, Joan has been taught the complete process of feeding herself, with the one exception of filling her spoon. But this done for her, she carries it to her mouth, takes a normal-sized mouthful, and returns the spoon to her plate. (She has learned to put the spoon down between mouthfuls as a result of the early attempt to develop the use of her hands by every possible means.) She has also learned to chew her food, probably due to her growing conviction that there is no hurry necessary, as she can have as much as she wants. Her glass, too, she puts down on the table; and she no longer tries to drink its whole contents in one gulp.

Early in her table training, Joan was constantly active, wriggling her hips and soulders alternately and continuously moving her arms and legs. But as her understanding of the eating process has grown, her manner has become increasingly quiet, and her movements more controlled and effective.

An interesting incident occurred at dinner one evening (about December 12th), when Mrs. Larsen held Joan's hands together during the blessing. The child remained very quiet until after the word "Amen", whereupon she burst out laughing. Since then, Joan always folds her hands, voluntarily, for grace, and again, at bed-time, during the prayer.

4. Development of Personal Hygiene.

Dressing. When Joan first came to Evanston, one of her few amusements was derived from tearing off her clothes; and although during October this habit was slowly being broken, she still frequently pulled off her shoes and socks and other articles of clothing. (C6) At the same time, and consistent with her early dislike to being handled, dressing her was a difficult task, and one which she heartily resented.

At present, although still unable to dress herself, she has become familiar with the process and readily and cheerfully assists by holding up a foot or turning around at the proper time; and seldom does she partially undress herself during the day.

Bathing. A bath was, in the beginning, one of the most trying ordeals of all Joan's routine activities—a process against which she vigorously rebelled. But in the course of the past months, she has learned to enjoy bathing, taking great delight in splashing the water around by using her hands and feet as little trip-hammers.

Joan still dislikes having her head touched, as when her nose or mouth is wiped or her hair combed, probably because these are unpleasantly associated with the cleaning of her ears and eyes. But if handled gently and slowly, she submits unwillingly as to a necessary evil.

5. Play Activities When Alone. Joan's increasing activeness when left alone has been previously mentioned. (H2) She finds the rocking-chair now and climbs into it without assistance; then, when some new vibration indicates activity in another part of the house, down she climbs to investigate. The scope of her physical activities is broadening considerably. Swinging motion of any kind remains a favorite pastime, but modifications of the original rocking-chair motion, which have been introduced as rewards for successful performance, seem to be preferred. On such occasions, Joan may be swung in the instructor's arms (in the Rock A Bye Baby position), bounced, or held tight as the instructor spins round and round.

Another early source of pleasure to Joan was the reception of vibrations. Her habit of throwing any object given her was, no doubt, largely due to the satisfaction she derived from 'feeling' the results of her physical exertion as the object hit the floor, for it was frequently noticed that she remained still for several seconds as though waiting for the 'sound', and when it occurred she often smiled and babbled. Early in the winter, as she began to wander about the house in quest of amusement, this habit was extended. (B3, C6) Any table-scarf, and lamp, books, or other objects which might be lying on it, were immediately pulled onto the floor; chairs were kicked, lifted and dropped repeatedly, or pushed and pulled across the floor, obviously in Joan's effort to produce vibrations. Naturally these activities had to be stopped promptly, so other noise-making objects were introduced in their place. Work with the Phonotactor was begun, and a drum was bought. Furthermore, Joan has herself become acquainted with various sound-producing household appliances, such as the vacuum cleaner and washing-machine, and the egg-beater, the vibrations of which she feels by putting her head against the table.

One activity that never escapes Joan's attention is that of dish-washing. Upon every occasion, she finds her way to the kitchen and delights in putting her hands in the warm suds, then raising her arms so that the water can run down to her elbows. Mrs. Larsen has sympathetically indulged Joan in this pleasure, despite the 'mopping-up' which is incurred.

In the fall when Joan was outdoors for a while each day, partly to satisfy her desire for the sensation of moving, and partly because she needed physical exercise, an attempt was made to teach her to ride a tricycle. She learned to sit on the seat, holding tight to the handle-bars, and even to stand on the rear axle with some assistance, and she thoroughly enjoyed being pulled around in this manner. But the pedals were a bit too low, and although, on several occasions, her feet were held in position, she did not manifest any desire to learn the operation for herself. Late in January, a stroller was obtained and has proven a successful means of getting her outdoors on the warmer days.

C. DEVELOPMENT OF PERSONALITY

By nature, Joan is a happy, even-tempered child. But the Larsen family's contribution in developing this innate tendency toward buoyancy of disposition cannot be over-rated. The constant improvement in physical health and stamina have, of course, evoked a proportionate cheerfulness and contentment of spirit. But this in itself would have allowed for little progress had she not been eagerly accepted as a member of this family circle, treated as a normal person receiving her full share of its common affection and cooperation. The four Larsen children (6, 13, 16, and 19 years of age) apparently take delight in Joan as an individual (rather than through any imposed pity or caution), joining whole-heartedly in her care and amusement; and this is not strange for, in spite of all her handicaps, Joan is an extremely lovable child. Her exceptional affection for "daddy" is appreciation enough of their mutual relationship; and Mrs. Larsen has patiently and consistently placed Joan's interests before all her many household responsibilities.

1. Disposition and Mental Attitude. During October and November, the effect of Joan's physical condition upon the experimental work was conspicuous. She resembled a little animal whose existence is entirely regulated by its physical and emotional reactions. Many hours of the experimental activities were entirely wasted after sleepless nights, and her prominent reaction of fear and alienation forestalled many attempts to broaden her contacts and abilities. (The necessity for having a given hour of the day reserved for the experimental work has been one of its greatest handicaps, in that Joan must be worked with as well as possible in spite of moodiness, fatigue, etc.; and she would derive far more valuable instruction if it were possible to give it to her, any hour of the day, just as she wanted and needed it most at the moment.) But with her growing comprehension of our desire to help her, and as the various factors in her environment are becoming familiar through exploration and prolonged contact, her personality is becoming defined. Confidence increases her interest in the external world about her; and the satisfaction she derives from her various achievements cultivates deeper patience and an eagerness to cooperate. And it is encouraging to note that during January almost no day has passed in which all of the experimental activities failed to enlist her attention.

2. Expression. Coincident with the increasing specialization of Joan's motor abilities, her means of expression are also developing toward normalcy. Four months ago, it was difficult to distinguish between her facial indications of, for example, repose and intentness. She smiled infrequently; and although her laugh was more common, it little resembled the hearty, contagious chuckle with which she now shows her appreciation of some secret humor, or the precious, sudden squeal of recognition with which she greets her friends. Joan is, today, quick to respond to an atmosphere of fun. In repose, she is more thoroughly relaxed than before; and her specific expression of intentness is accompanied by general body rigidity and a tautness of certain facial muscles. She has developed an amusing habit of hitting her head with the back of her hand when prolonged attention has failed to bring about the desired results. It is as though she would help this new idea get into her head by giving it a manual push.

One satisfying indication of the growth of Joan's personality occurred on January 12th, when, for the first time (observed), she indicated by vocalization and a change in physical position that she definitely preferred swinging to jumping at the moment. Until that time (and barring the initial refusals of activities through fear and confusion), Joan's initiative had been limited to vocalizations provoked by the halting of some activity which she had been enjoying. On this occasion, it was strictly a matter of her choice between two performances.

Again, on January 13th, she was observed suddenly to interrupt her swinging just long enough to scratch her ankle, and then the swinging was immediately resumed. (B) Only to those who knew Joan three or four months ago, when all her movements were heterogeneous and undefined, could this simple act possibly serve as an indication of the progress she has made. Here was a rapid alternation of two specifically directed motor activities, and, even more important, evidence that she is learning the separate identifications of various environmental and internal stimuli, and can hold one pattern of activity in her mind while engaged in another. Since that time it has been increasingly difficult to side-track Joan once she has decided what she wants to do.

3. *Preferences and Aversions.* In October, as during the whole of the summer, Joan's sources of enjoyment were only two-fold, including, first, the sensation of moving, and second, the reception of vibrations. How the attainment of these satisfactions was developed, from the early habits of swinging and dropping or throwing objects, into a variety of physical activities and motor abilities has already been described in the account of her Motor Development. Her inability to adjust herself to cold weather has also been stated. It should be mentioned here, however, that as she began to use her hands, Joan developed early aversions to certain objects. A strong repellence to fur was noticed at an early date, but during December a cat was added to the house-hold for a short while, and in January the family obtained a police-dog. (B3) Having these animals around her soon overcame her distaste for fur, but Joan has yet to learn objective sympathy and gentleness for live things, and one never knows whether she will push a cat away altogether or pull its leg toward her vigorously. (C4) Cold, metallic objects remain somewhat of a mystery to the child. (B3) She will, upon occasion, feel the microphone of the Phonotactor curiously, but she will not hold it in her hand.

Concerning preferences for food, there seems to be nothing that Joan dislikes eating, or any time that she is not hungry, regardless of the size of her meals.

4. Social Development. Only within the past five or six months has Joan seemed to learn the meaning of affection. When she was first brought to the Larsen home and the experimental work was begun, physical contact of any kind evidently was, in Joan's mind, unpleasantly associated with attendance upon her biological needs. No such thing as a caress existed, and she seemed to have little idea that anyone could love her (or express that love), probably because she had not, at that time, a social feeling. At present, the experimenters and members of the family feel justified in describing Joan as a very affectionate child, and in saying that she understands and appreciates the less subtle demonstrations of affection from those about her. She obviously enjoys being hugged, and she greets the experimenters by stretching up her arms to be lifted, whereupon she gurgles contentedly and snuggles close against them. When Mrs. Larsen or one of the experimenters holds Joan on her lap and talks to her, Joan often places her head in the curve of her companion's throat, holding her arms tightly around the other's neck. (But this is probably due also to her attempt to receive the voice vibrations through her head.)

Joan's relationships with familiar persons have distinguishing characteristics now, whereas five or six months ago she could not readily distinguish between different people and certainly showed no preferences as long as she was made physically comfortable. In general, she seems to like men better than women. Her affection for Mr. Larsen is, perhaps, the most enthusiastic; while it is Mrs. Larsen who can best make Joan understand and has been most successful in disciplinary measures. The experimenters are obviously recognized, and their arrival is always greeted with excited vocalizations and laughter, and a general attitude of delighted expectancy.

Joan never could have been described as a shy child. Few strangers visit her, but ample opportunity to observe her under such conditions was afforded during the week of January 4th to 11th, when newspaper reporters and photographers came to the house at least once, and sometimes twice, daily. Joan was not, at any time, frightened, and in one instance made friends with a photographer immediately. But her reaction to the unaccustomed noise and confusion has been previously reported through her hours of sleep for that week and a fretfulness and flightiness of interest and concentration which characterized her manner through the period.

5. Approach to Joan. It has been found that the best approach to Joan is through an atmosphere of fun—as though the whole experimental training program were merely a game which she and the experimenter are privileged to play together. Any heaviness of spirit or impatience that the experimenter may feel is instantly sensed, and causes marked confusion and disinterest; and irritability in the examiner produces a corresponding antagonism in Joan. One must be constantly alert to recognize the childish moods, to alternate types of activity or to modify a specific activity. Thus, one afternoon may be profitably engaged in quiet work with the Phonotactor, while on another day, Joan demands continuous physical exertion. Again, suppose that, on such an occasion, she is impatient of perfecting the correct vocalization for a given activity through practice. It is impossible to keep her still long enough to have her feel the lip and throat movements of the experimenter. Then, the sound must be repeated over the Phonotactor and an imitation correct in rhythm or pitch must suffice until she can be led back to the original procedure. This anticipation of Joan's reaction to a situation also serves as an anti-disciplinary method. She is not given opportunity to develop such habits as crying when she cannot have her own way.

There must be enough variety of activities to keep Joan always interested, but not so many different units of activity that their objectives become confused in her mind. Above all, no activity should be continued long enough to become tiresome, and the experimenter must counteract tendencies toward discouragement on his part, for at no time should Joan be allowed to feel that she has failed.

6. *Discipline.* From the beginning, some of Joan's more destructive habits needed immediate correction, such as kicking chairs, pulling objects off a table and dropping them, throwing her food on the floor, and removing her clothes. (H5) The matter of discipline was, at first, a baffling problem as Joan had not then begun to respond to social approval, and as her hands could not be held or slapped because it is largely through her fingers that she will become familiar with her environment and it was imperative that she increase their use and dexterity. An early method of lightly snipping her fingers was immediately discarded when Mrs. Larsen invented the ingenious technique of touching Joan's elbow (or knee), holding the joint firmly for a moment if necessary, so that Joan could not move the offending limb. This method has proven very successful, usually a light touch being all that is necessary to bring about the desired results.

D. Mental Ability

It is impossible, lacking standardized norms and procedures, accurately to measure the innate mental ability of a child who is blind and deaf, and also mute. But certain mental characteristics which have been frequently observed lead the experimenters to believe that there is considerable intelligence imprisoned by Joan's sensory limitations.

Curiosity is, perhaps, the basic mental trait upon which the acquisition of knowledge depends. Certainly, it is a prominent feature in the character of the normal child. Joan is lacking in this respect. It seems that previous training had tended to frustrate her early attempts to explore her environment manually. But as the use of her hands has been enlarged, curiosity has developed. Recently, when given an unfamiliar object, her first response of rejection has been supplanted by an intense desire to learn more and this compels her to return again and again to her investigation of it.

Correspondingly, imagination and initiative are slow to take form. Joan is constantly seeking new forms of physical motion, and new sources of vibration, and, when unsuccessful, devises her own means of producing the desired sensations. But as yet, her devices show little ingenuity, for it is doubtful that she perceives an object in its entirety or in specific relation to its use. A rocking-chair rocks, to be sure, but she has not yet been observed to feel its various parts in an effort to obtain a mental impression of the organized whole, or to try to discover why some chairs rock and some do not.

Of interest and persistence Joan has an abundance. She has, on several occasions, concentrated for as long as 30 minutes on the tactual reception (and her attempted reproduction) of some new vocalization, and then it was the experimenter who initiated another activity. It seems evident, after considerable observation and experimentation, that Joan will attend diligently to any activity the purpose or procedure of which she can grasp mentally. It has been found that lack of interest is often due to the experimenters' inability to make clear to Joan what is expected of her, and this is not surprising when one remembers that much of what Joan has yet to learn in the fields of language and sensory discrimination the normal child has established even before he can talk. One of her accomplishments in which Joan takes unfailing delight is her ability to initiate an activity by specific vocalization. Since this concept of "sound action" has been developed, she has shown increasing patience and persistence, and even eagerness in her attempt to learn new sounds and to express herself vocally. This tremendous satisfaction in achievement which is so frequently observed in Joan is a valuable incentive toward further progress, and compensates, in part, for her lack of curiosity.

One day in early January, three new vocalizations were associated with variations of the swinging and jumping movements. The second day thereafter, Joan accurately associated every sound symbol (corresponding to our words) with its proper activity. Again, about two weeks ago, a certain vocalization was used when Joan was bounced in the experimenter's arms. This activity proved too exciting and was discontinued; but ten days later, when the bouncing was accidently repeated, Joan made the correct sound.

E. HEARING

Early in the experimental work it was noticed that Joan received the vibrations of certain voices (apparently the low pitch of men's voices) more readily than others. Also, that she could, with some practice, reproduce vowel sounds of a percussive type, as a sharp "Ah—ah." It is not known to what degree she can hear, if at all, or what the pitch and intensity of the sound must be so that she can hear it. Once in a while, the pupillary reflex occurs, suggesting that Joan has heard the sound, as in the case of a horn which was introduced on October 19th. When we can get her cooperation we will test her for hearing by some form of conditioning experiment.

From time to time, Joan has enjoyed a game of mimicry in which the experimenter repeats each sound she makes. Usually this results in a form of rhythmic chanting, and occasionally, when the experimenter breaks the rhythm, Joan hesitates as though awaiting the belated response. But whether or not this is actual hearing (in the common sense of the term) is undetermined. If so, it would appear that she should have made more progress in speech than is in evidence. Recently it was noticed that if she is rocking while Mrs. Larsen uses the vacuum cleaner, Joan rocks as long as the electrict current is on, but the moment that the current is turned off she abruptly stops her chair (by bracing against the toes of her shoes) and waits, sometimes for several minutes, for the current to be turned on again. It is not known whether she hears this noise, or whether it is received tactually.

About the beginning of January, Joan was taught the meaning of "up" and "down," and also, of "stop" (F. 2). It is not certain whether she hears the sound or merely recognizes the pitch and inflection of the vibration, for the response is not the same for all people, nor is it uniform in the case of any one individual.

Following this, Mr. Larsen made an attempt to help Joan localize the source of a vibration. The command "come here" was used, and Joan was taught the meaning of the words. Her skirt was pulled, leading her in the direction of the sound, every time the words were repeated, and each time she came to him she was rewarded by being swung high in the air. Usually she recognizes this command, and will respond by walking, haltingly, in a generally correct direction, and waving her arms. Whenever she finds the experimenter she is lifted and caressed by way of reward.

F. Language

1. General Vocalization.

Joan is not, technically speaking, mute. In fact, she has a rather large repertoire of sounds, considering her sensory defect. She has always had a tendency toward vocalizing to herself, and in the last two or three months it has become one of her favorite pastimes. Her vocalizations are, however, chiefly single sounds which can be made by simple movements of the throat or by touching the back of the tongue to the soft palate. As yet, she has developed very little lip movement, evidently failing to recognize the formation of certain sounds by various positions of the lips.

A prolonged "ah" was one of the earliest of Joan's common vocalizations, and often occurred rhythmically with the forward and half of the backward motion of the swing or rocking-chair. (B2) Sometimes it is combined with "n" or "m" to produce "na-na-na-" or "ma-ma-ma-." Another vowel sound which has been frequently heard is "a-a-a-" ("a" pronounced as in "fat"). Rapid alternation of "t" and "k," or of their guttural equivalents, "d" and "g," produce a vocal sensation which Joan envoys, namely, "t-k-t-k-t-k-" and "d-g-d-g-d-g-." With the exception of the "t," these consonant sounds seldom occur singly. Soft "h," as in "huh-huh," is produced as a noise or expulsion of air rather than as a specific vocalization; but the hard "h" is sometimes followed by "e" (as in "get") to give "he-he-he-." "Yi-yi-" ("i" as in "ice") is another of Joan's favorite vocalizations and is frequently added to a shortened "ah," producing "yi-ah!," or, merely "i-yah!." Continuous "sssss" is also familiar to those who work with her. "Ee" (as in feet), sometimes becoming "ee!-ah!," and "o" (as in "or") have been formed only a few times.

The improvement in Joan's vocal activity has concerned, not an increase in the total number of sounds themselves, but perfection of her ability to pronounce and distinguish between the sounds which she previously made. In October, Joan's vocalizations were unpleasantly guttural; her voice was husky, and her pronunciation of sounds was indefinite and always accompanied by a superfluous intake or expulsion of air. She has developed great variety of pitch, and the duration of her vowel sounds has decreased noticeably.

2. *Special Vocalizations.*

Much of the experimental work has focused upon teaching Joan to associate specific sounds (her substitutions for words) with certain objects or activities. Not much progress has been made in "naming" a block or a ball, because it is only recently that she has been willing to hold an object in her hands for any length of time. But her love of physical activity offered a good substitute, and she has learned, in four months, about seven definite sound action patterns.

Early in October, the experimenters took advantage of two activities which Joan had herself made to coincide, and resolved that "Ah!-ah!" should be her first "word," and that it should mean "swing." At that time, her vocalization of this vowel sound was prolonged and throaty; but her pupillary reflex indicated the possibility that she could, occasionally, hear it if the experimenter's voice was loud and staccato. Then, for about fifteen or twenty minutes every day, Joan was taken outdoors and swung. At intervals, the swinging was stopped and only when Joan produced the required sound was it continued. She was encouraged to feel the experimenter's throat, and the more accurate her vocalization, the shorter and clearer her sound, the longer could she swing. At first, she cried and tried impatiently to start the motion herself; but it did not take her long to discover what was required of her, and in little more than a week's time she readily gave the correct response. It was easy to apply this new "word" to rocking as well, for Joan's pride in her new achievement manifested itself through constant use of this vocalization. That it actually became, for her, a word, with a meaning ("more swinging" or "do it again") was clearly illustrated one day in November when she had occasion to ride in an automobile. Each time the car was stopped for a traffic-light, Joan immediately, and on her own volition, said "Ah!-ah!."

This same procedure has been used to establish other "words," but the process has been considerably shortened. Once Joan had grasped the sound action pattern, she was pitifully eager to learn what other sounds would produce the particular activities which she enjoyed. Difficulty has, of course, arisen from the experimenters' inability to know whether Joan could distinguish the specific sound that was desired, despite the fact that in every case only those sounds were chosen which Joan had already been heard to pronounce. Sometimes it was necessary to start an activity and then let Joan's first new vocalization be used to represent it. Sometimes vocalizations which were used one day were not recognized the next. But gradually certain sounds and activities became permanently associated and hence, "Yi-yi-yi" (exactly three repetitions) and "Yeeeuh" have come to represent two different kinds of jumping; "t-t-t-" permits her to hold the experimenter's hands and swing her body backward and forward (her right foot always behind her left); and when she says "d-g-d-g," the experimenter holds Joan in her arms and swings her from side to side. Usually such associations, once clearly understood, are unerringly fixed in Joan's mind by the second, or at most, the third day.

3. Development of the Concept of Language.

Joan is rapidly learning that she herself can initiate certain activities merely by producing the associated sounds, and often changes one activity for another in this way. This is a great step forward, but the relatively simple concept of word-definitions is not, in itself, enough background for an understanding of language. Even before he has learned to speak, his environment has already acquainted the normal child with two basic principles of language, namely, the pattern and the fluency of normal speech. He learns that certain patterns and inflections bring about certain results long before he knows the meanings of the single words; and he absorbs the continuity and mobility of speech long before he knows there are single words. Joan Higgins never had an opportunity to become familiar with these important elements of verbal communication, and this deprivation is emphasized by the nature of her simple vocalization. Her chattering (the normal learning process of any child, whether he hears through his ears or his fingers) is almost wholly constituted by the monotonous repetition of isolated sounds. For her, there has been no stimulus to suggest the possibility of combining the sounds to make words, or the words to make sentences. It would seem that Joan's process of learning to speak is the direct reversal of the normal, that she is learning "words" (or their equivalents) before she has learned how to use them.

Even at this comparatively late age, much can be done to teach Joan about the pattern and fluency of speech through constant contact with the lip movements and throat vibrations of her associates. And with this aim in mind, Joan should be read to as much as possible, in an attempt to make up for her lack of early association with the various elements of speech. She seems to understand the connection between the experimenter's throat and her own, for time and again, during the past month, her hand has been placed on first the one and then the other during speech. She likes to sit quietly in someone's lap and feel his voice as he talks or sings to her, and she is more and more frequently observed to feel her own throat when she is vocalizing. (G) But no incentive has, as yet, been provided which sufficiently encourages her to mimic the throat movements of other people, and this is, no doubt, largely due to her ignorance concerning the meaning and nature of language. However, this desire to mimic must obviously soon be established as a basis for any further progress in Joan's ability to speak.

Also within the past few months, it has been noticed that Joan's manual exploration of the experimenter's throat is characterized by steadily increasing perseverance and awareness of detail (B3); and this is an important step toward the development of greater sensitivity to the vibrations of speech, gradually enabling Joan to detect differences in pitch, word stress, and rhythm. Toward this end, it is the aid of the Phonotactor upon which the experimental work depends.

4. Use of the Phonotactor.

Work with the phonotactor was begun early in November, and, from the first, Joan's interest in it has been inexhaustible. At the time of its introduction, she had already learned to feel the experimenter's throat, although she did not then do this spontaneously, nor had she developed interest in her own voice. And it was comparatively easy to show her the connection between the experimenter's throat and the vibrating unit of the Phonotactor. Throughout her work with this instrument, one hand, and frequently her head, receive the vibrations of the Phonotactor, while the other hand is placed upon the experimenter's throat and lips. From time to time it has been possible to hold the microphone in front of Joan's mouth and let her feel the vibrations of her own voice; and, upon such occasions, she will, with increasing frequency continue her vocalization, sometimes placing her free hand upon her own throat. She likes best, when working with the Phonotactor, to be sung to, for singing provides continuous and rhythmically varying vibrations. And when singing to her, the experimenter often moves a finger over Joan's body, tapping or patting her lightly in time with the song, or lifts the toe of her shoe rhythmically, to give her an added, physical sensation of tempo. "London Bridge" is the only song Joan obviously recognizes, and she invariably chuckles on the line, "My fair lady."

Since the advent of the Phonotactor, Joan's language abilities have shown marked progress. Her vocalizations, which were, in October, almost wholly deep, throaty noises, now contain numerous variations in pitch. After hearing a given sound repeated over the phonotactor, she frequently vocalizes on the same pitch as that of the original sound; and when babbling to herself, is often heard saying, "Ah-ah-ah-" on different notes of the scale, sometimes each "ah" being higher, and sometimes lower than the one preceding it. Again, whereas in October most of her sounds were on a protracted monotone, Joan has, to some extent, developed her sense of speech patterns. Thus, besides being able to reproduce the pitch of a sound she has felt on the Phonotactor, she can also reproduce the accent of a given word pattern. For instance, after feeling the verbal pattern of the command, "Clap your hands," Joan produces an "Ah-ah-ah" sound of which she stresses the first and third syllables.

Since November, Joan has, with the aid of the Phonotactor, learned to recognize four patterns of speech with considerable accuracy, "Up" or "Get up," "Sit down," "Come here" (between these, the inflection is, apparently, an important means of distinction), and the question, "Are you hungry?", to which she responds by laughing and wriggling expectantly. As she feels the words "Are you hungry," her hand is drawn forward, palm upward, and a piece of cracker is placed in it. The hope is, of course, that she will one day extend her hand by herself when she feels this peculiar arrangement of vibrations, proving conclusively that she has learned to respond to a pattern of speech. Further work is being done with such words patterns as "shake your head," "jump up and down," and "turn around," and in each case, Joan feels the special vibrations of the sentence by placing one hand on the Phonotactor and the other upon the experimenter's throat as the words are repeated, and then she is turned around or her head is moved from side to side, as the case may be. That she can someday know these and many other word patterns is proved when one remembers that she already 'gets up' and 'sits down' and 'comes here' when called.

Another phase of the experimental work with the phonotactor has been an attempt to help Joan distinguish between single vowel or consonant sounds. As an approach, sounds already familiar were chosen, preferably those which had been associated with some specific activity. For example, Joan was swung in the experimenter's arms, and then the swinging was stopped and she was allowed to feel the vibrations of "d-g-d-g" on the Phonotactor. After she had repeated this sound herself the swinging was resumed. Joan will sometimes repeat "ah-ah," "i-yah," and "d-g-d-g," and a few other sounds when they are spoken into the microphone, but her performance is not accurate. Not much emphasis has been placed upon the recognition of single sounds, however, because that requires greater sensitivity and familiarity with the sounds than Joan has yet been able to develop, and because it will be easier for her to distinguish and reproduce single sounds some time in the future after she has learned to mimic lip, tongue, and throat movements in their formation.

G. Tactual Reception

Early in Joan's training, when intensive manual exploration of her environment had been inhibited, she had learned to substitute her head and feet as organs of tactual reception. This was well illustrated on October 8th, when the drum was presented to her for the first time. As long as the experimenter continued beating it, thus providing the vibrations which Joan enjoyed, the child let her hands rest upon its surface (either the face or the side, although she made no attempt to feel it as a complete unit); but more frequently, she received this sensory stimulus through her feet (whether or not she was wearing shoes) and through her head. Sometimes, these three organs have been used simultaneously, and sometimes, separately. Also, in November, during her early contact with the Phonotactor, Joan again used all these body parts.

Because she often kicked these instruments impatiently, it was necessary to break her of the habit of using them in this way. But she has been permitted to continue the use of her head as an organ of sensory reception, and now, when any object producing vibrations is given to her (as the bead-rack, drum-sticks, etc.), she always tries to feel it with her head.

H. SENSE-TRAINING ACTIVITIES

Endeavoring to stimulate Joan toward greater use of her hands, and in an attempt to familiarize her with the physical properties of objects in her environment, a large part of the experimental work has centered upon various sense-training activities.

1. Form Board. During the summer, Joan had become acquainted with the Seguin Form Board, and throughout the fall and early winter, work with this object was continued. Beside the manual dexterity that would result through frequent handling of the blocks, it was hoped that Joan would learn to distinguish the various shapes, thus becoming aware of angular, pointed, and curved surfaces (as such) in her environment.

By the time that the experimental work was resumed in October (after three weeks following the close of summer session), Joan had learned to remove all the blocks from their forms; but this done, she reverted to the activity of lifting and dropping (usually one) blocks upon the floor, thus producing satisfying vibrations. Her concept of the form-board as a unit appeared to be "blocks-come-out"; but this activity required no investigation of the different forms. In an effort to establish the "blocks-go-in" concept, the experimenters began to put a block in Joan's hand and make her feel it; then her other hand was placed in the form, and her fingers were traced around the edge of the hole; and finally, the block (still being held in Joan's hand) was placed in its correct form. At the same time, another block was hit against the floor to associate a satisfying sensory stimulus with the act of fitting the blocks into their places on the board. Joan learned, in time, to expect the block to be returned to its form after she had removed it, for often she would let her fingers rest upon the block as she waited for the experimenter to take her hand, guiding it so that the block was again put into position. But she never made any attempt to put the block in its form independently. The concept of "blocks-come-out" had been thoroughly established, and although she was willing to let them be put in again, she took it for granted that *her* part in this game was to remove them. Furthermore, it was suspected that the blocks were too large for her little hand to feel them (at once) as units. Since

December 18th, work with the form board has been discontinued until some time in the future when the concept of "blocks-come-out" will perhaps not be so strongly emphasized, and when increased manual experience in the meantime will enable her to better understand the significance of the various shapes.

2. *Blocks and balls.* Joan has, throughout the past six months, been exposed to a great variety of blocks and rubber balls, but without much success in the development of her interest in them as toys. (B5) Her chief handicap lies in that, once having thrown them, she cannot find them again. But Mrs. Larsen has made recent arrangements for having a large play-box built for Joan, and it is hoped that, when so situated that her toys will always be within reach, she will learn to play with them.

3. *Bead-rack.* Another toy that was chosen (November 19th), in the hope that Joan would find some occupation for her hands when she was alone, was the bead-rack. Spinning or shaking the beads provided plenty of vibration, and because the object had, also, movable units, it was thought that she would find it entertaining. She showed immediate interest in the sound produced by shaking, but refused vigorously to hold the rack in her hands. Then the experimenter placed the rack between Joan's legs while she was rocking. As Joan rocked forward, her arms were extended and her hands placed on the far side of the rack, and with the backward motion of the chair, her hands were drawn toward her over the beads, thus spinning them. Only a few repetitions were needed before Joan learned this procedure and continued it independently for several minutes. In this position, however, the rack had to be held steady by a second person, so, in order to stabilize it, it was fastened onto the arm of the chair. This proved an uncomfortable arrangement for Joan, and the rack was subsequently broken when given to her to play with alone.

4. *Drum.* The value of the drum in developing rhythmic patterns has been discussed in another section of this report. It is additionally valuable as an incentive to manual expertness, if Joan can be inspired to learn to use the drum-stick herself. Two methods have been used toward this end.

At first, because Joan refused to hold the drum-sticks, she was encouraged to beat upon the drum with her hands, and this she sometimes does, although she prefers to receive the vibrations of steady, strong beats made by another to the imperfect, muffled poundings of her own creation. Later, she allowed her hand to be held around a stick while the experimenter beat it, and occasionally she continues the beating herself (after the experimenter has let go) before she drops the stick. Greater ability to manipulate the drum-sticks, and more sureness of direction must be developed before Joan can learn to beat rhythms.

5. *Rewards.* By way of reward for successful performance in many of these sense-training activities, Joan has been given gumdrops and small pieces of cracker (C6). Two obstacles, however, prevent this from being a satisfactory indication of the experimenter's

approval. In the first place, Joan's primary interest in eating detracts from her attention in the original activity; and secondly, the process of getting the gum-drop into her hand and letting her eat it is not often accomplished smoothly and quickly enough for accurate association between the reward and the rewarded performance. And putting the food directly into her mouth also fails to associate the proper manual accomplishment with its reward.

On the other hand, Joan's development as a *social* individual has enabled the experimenters to use, more and more frequently and successfully, the more normal and natural reward for social approval. Recently, caresses have been used almost exclusively in praise of Joan's response.

PART II

February 1 to May 28, 1937

OUTLINE

A. HEALTH

B. STRENGTH AND COORDINATION

C. BROADENING TACTUAL AND MANUAL EXPERIENCE

D. SOCIAL DEVELOPMENT

E. SPEECH

The progress Joan Higgins has made, in the past eight months of experimental and home training, has been singularly rapid and well-distributed among the fields of her possible development. However, during the latter half of the year it has been less spectacular than before. The speed and fullness of her early accomplishment was, no doubt, due primarily to the breakdown of old personality barriers against contact with her environment; and the sudden release of a natural attentiveness and response to her surroundings, together with the encouragement and guidance offered by her new associates, quickened her insight into the simplest social and mental relationships and promoted remarkable improvement in physical coordination and endurance. This period of intense acquisition of new physical abilities, manual experiences, and such realizations as that of the existence of social expression for her biological needs or personal desires, necessitated an ensuing period of relative passivity during which all that had been absorbed could be assimilated, when Joan could adjust herself to her new understanding of her environment and could give her new attitudes and abilities a meaningful daily expression. Furthermore, the next steps were more difficult; and finally, most of the experimental work during the past four months has been centered around speech development. It was thought that Joan's language ability should be pushed forward as rapidly as possible as an important basis for further social and mental growth; and the speech exercises, arranged in the form of games, provided social and mental exercises as well.

A. HEALTH

Of fundamental importance is the condition of Joan's physical health, and this has been consistently good during the whole spring semester. Her sleep has been stabilized for over two months at ten to eleven hours per night, with only brief and environmental irregularities; and whenever she wakens early in the morning she is given a nap before noon. Eye and ear discharges have steadily decreased except during the third week in May when a slight, temporary increase occurred with the onset of hot weather. Lately, Joan's stools have been normal and her excretory habits regular; and as long as she is given an opportunity to urinate approximately every hour she has learned to keep herself dry.

B. STRENGTH AND COORDINATION

In physical strength and motor coordination Joan has made steady progress. She is active about the house, walking from room to room with increasing confidence and speed. But although she usually extends her arms in front of her and feels the objects with which she comes in contact, there is little indication that she has organized any 'mental floor-plan' of the house or that she has any idea of the relative arrangement of the furniture. She recognizes both beds and chairs when these objects are encountered, and will often climb upon them; but this action seems to be more of an afterthought than an original purpose. Just as in her handling of objects there is no apparent search for complete form or unity of shape or function, so Joan's locomotion is apparently unmotivated by any predetermined desire or intention on her part.

We record this merely as another observation, however, for it is quite possible that as any comprehensive criticism of the child's progress it may be of little value. How could Joan, for instance, demonstrate by use her recognition of desk, table, or bureau? And when definitions-by-use are eliminated by her lack of experience, how distinct, to touch, are the other characteristics of these articles of furniture? Finally, until she has learned the placement of furniture and the arrangement of rooms (as room-units), she could do little more than wander from room to room and grope about for the rocking-chair even though she knew she wanted to rock. The blind-deaf's expression of a personal desire is obviously complicated by conditions vastly different from those of a normal person, while our means of expression are so simple and universally understandable that it is almost impossible for us to penetrate to the essentially basic problems faced by the handicapped child.

Lack of knowledge concerning social custom may account for Joan's failure to seek a bed or chair when she wants to rest in preference to the floor. But on the other hand, it is quite obvious that she has not yet learned to initiate a desired activity by giving the proper sound (word), although she knows that she can cause its continuation or repetition by "naming it." This also might have a direct bearing upon the nature of her mental activity.

There has been little expansion in the field of Joan's private play activities. Besides those mentioned in the first part of this report, she enjoys rocking to the vibrations of the radio and vacuum cleaner. Occasionally, she has been observed to keep time with various musical rhythms, but this response is neither versatile nor regular enough to, alone, warrant any conclusion about her sense of rhythm. Very little work with the drum has been conducted during the past four months, as the hours of the experimental training have been limited and it was thought wiser to concentrate upon a few important phases of Joan's development than to risk superficiality and confusion by a great variety of activities. But occasionally, when the drum has been used, and Joan is led to walk or sway to rhythmic patterns beaten on the drum, her response to tempo and emphasis has always seemed exceptional for one of her experience. One favorite source of vibration which the household supplies is the vacuum cleaner. Joan is usually taken to her little rocking chair where she rocks continuously as long as the current is turned on. But the moment the machine is disconnected her two feet firmly press against the floor, her chair is brought to a standstill, and she will wait several minutes for the vibration to be recontinued before she begins to rock again.

C. Broadening Tactual and Manual Experience

Joan has overcome her fear and a large part of her dislike for physical contact with strange objects and usually permits her hand to be guided over most of the new articles presented to her. Indeed, she frequently shows her interest by studied attention. Early in April, a new visitor to Joan suggested that part of the experimental training be devoted to giving the child a variety of manual and other physical experiences without regard for the specific educational implications they might involve. As Joan's contact with her environment is, and always will be overwhelmingly tactual, and as the conditions of her early life prohibited the manual explorations natural to childhood, our friend suggested that an attempt be made to remedy this situation. It was argued and agreed that all children make first and elemental observations privately, by accident, and often only after prolonged contact with a given characteristic of the physical world. Adult thought is based upon knowledge of these fundamental facts, and yet it has accepted them for so long that it could never hope to devise an educational program which would even begin to include all the things about the world that the young child must discover for himself.

As a result of this suggestion, the planned experimental activities have been interspersed with all conceivable kinds of tactual experience. Joan's hands have been passed over surfaces of all available shapes and degrees of hardness, dryness, heat, etc.; blocks of different shapes have been moved appropriately up and down her arms and legs and against her neck, and she has even been encouraged to feel them with her mouth and tongue. The satin lining of a coat, a fur collar, the sharp corner of a table, a crumpled paper bag, the metal surface of an oven door; rubber, hair, fringes; the hole in the water faucet or in a tinkle-toy block; the leafing of the pages of a book; a narrow, leather belt pulled slowly or swiftly through her fingers; and outdoors, grass and hoed earth, pebbles and cement, wooden fences, screen doors, flexible twigs and leafy branches—anything and everything has been exposed to as many parts of her body as possible; and beyond that, she has been introduced to hot and cold water (*un*associated with bathing), and many combinations of her own arm, head, and leg movements. Except for letting Joan feel the names or descriptions of many of these new objects and activities, especially in the cases of opposites (such as up and down, and fast and slow), little thought has been given to associating or comparing them for her. For the present, at least, they are merely experiences—experiences which Joan will sooner or later learn to classify for herself according to her own methods of distinguishing among them, just as the hearing child experiences high, low, loud, staccato sounds long before he is aware of their origins or meanings, or of the words which describe them.

Joan's apparent oblivion to various odors has been observed from time to time throughout the year. Detailed experimentation has not been conducted in this subject, to date, but no response to certain strong food and flower odors has been forthcoming when they have been presented to her upon several occasions.

D. Social Development

After prolonged association with Joan, it is difficult to determine at just what point the child's degree of growth ends and the "teacher's" growing understanding of the child begins; yet not only the experimenters in this case but, even more emphatically, those who have met Joan only two or three times during the year, remark upon the tremendous progress she has made in her development as a social individual. True, there is still only the slightest, most elemental means of communication for even the bare essentials of her existence, and Joan has little social perception beyond some undefined acknowledgment of the love and companionship and perhaps the service of those few who are close to her. But it is also obvious that, during the past year, Joan has learned to recognize eight or ten other human beings which are like her in certain respects (whatever her idea of herself may be), and to associate with them most of her experiences of play and comfort and personal attention. Her own reactions to external stimuli and the emotional expressions of these reactions are becoming more diversified and, if not controlled, at least more intelligibly directed every month.

It has been interesting to observe that Joan's best work is done under tension, the muscular and emotional tension produced by strenuous physical action which she thoroughly enjoys. This may be due, in part, to a personally responsive attitude established by indulging in play activities which please her, but as other types of play fail to have a similar effect there would seem to be a definite relationship between muscular and nervous tension on the one hand and mental alertness on the other. Largely as a result of this relationship, in fact, it was necessary, during the early stages of the experimental work, to associate all attempts at vocalization with physical stunts (although the fact that such activity was on a level of Joan's understanding of deliberate accomplishment also contributed). Within the past few months, however, the child has shown a definite ability and even eagerness to reproduce sounds merely for the sake of what satisfaction she derives from mimicry; and there seems to be some indication that she is beginning to perceive sounds (or combinations of sounds) as "name-tags" for the familiar objects and activities with which her little head is so busy. Still, it is always expedient to precede work on the Phonotactor or on lip and throat vibrations by physical exercise for that considerably increases Joan's attentiveness and quickness.

E. Speech

It is in the field of speech that the greatest development has taken place in the last four months. In less than a year's time, Joan has acquired all the basic sounds except "r," "ng," "s," "z," "f," and "v," and as these are the more difficult of those found in the English language it is natural that the acquisition of them should be more retarded. These sounds have occurred infrequently, but so far it has been impossible to elicit their vocalization upon request, and Joan has not even learned to repeat them independently as she does with "l," "th," and "p."

She has learned to use her lips, not with any normal variability or keen insight into the function of the lips in oral speech, but enough to reproduce "b," "m," and certain vowel sounds with considerable accuracy. Joan is quick to feel her companion's throat and lips upon all occasions when she knows that vocalization is taking place, or during such lulls in physical activity when she suspects a verbal comment from her comrade. Prolonged contact with the throat vibrations and lip movements that characterize sounds which she knows has finally enabled her to distinguish between such consonants as "d" and "g," "t" and "k," "k" and "g," and "b" and "d." In this respect, the Phonotactor has been invaluable by helping her to discover that only one of two sounds (such as "k" and "g") is hard, although each is produced by the same movement of the gutteral muscles. Those sounds which are dependent upon tongue movements have been most difficult to introduce to Joan because of her inability readily to feel the tongue's actions. Some sounds, such as "t," "d," "k," and "g," occurred frequently enough in her own babblings so that it was possible to retain them quickly associating the vocalization with an external event. Others, as "r" and "l," rarely occur, and the positions of the tongue for "s," "z," "ng," and "th," are almost impossible to demonstrate to her.

Joan has always been able to judge quite accurately the duration of certain vocalizations; and she imitates simple vocal patterns very well, especially those expressed in sounds with which she is most familiar. Recently, special emphasis has been placed upon control of the breath for specific sound formation, such as "s," "z," "f," "th," etc. The experimenters would blow lightly on Joan's hands, arms, neck, or into her hair, and the child was made to feel the experimenters' lips during these expulsions of air. Finally she learned to blow, in turn, upon the experimenters' hands, upon her own hand, or just to blow, and in so doing (and in the praise which followed) she took great delight. The next step is that of associating the blowing with different mouth formations for such sounds as "f," "s," and "th," and then adding to these a throat vibration thus producing "v" and "z."

The experimental work has not, however, emphasized Joan's production and reproduction of single vowel and consonant sounds. The importance of vocal patterns as a basic speech construction has been discussed with reference to this work in the January report; and all the experimental instruction in language has centered about its rhythmic qualities of tempo, inflection, and continuity. Even single sounds have always been studied in pattern form, as b-b-b-b-b (given various accents) and "eee-ah!" (with varying durations of the vowel sounds).

More frequently, Joan's linguistic contact has been with larger units, such as those produced by the combination of simple sounds, giving words, or of words, giving phrases. With this in mind, Joan has been read to for a while almost every day, the length of time depending upon her mood and prevailing interest. Both prose and poetry have been employed, but most often the simple nursery rhymes familiar to all children have been read or sung to her over the Phonotactor, and these Joan enjoys most. She may interrupt the reading to indulge in vocalizations of her own; or the rhyme may be selected for its repetition of a certain sound which is being worked with that day. The experimenter will then stop in the middle of "Hickory, Dickory, Dock," for example, to emphasize the "k," and may next pass on to such a series as "key, kitty, cow, come, cold." Upon other occasions, the experimental work may be presented from another angle. If Joan is temporarily intrigued by a self-initiated long "a," she is encouraged to vary her articulation by adding other familiar sounds, first separately but in sequence, and gradually more closely connected until words are formed, such as "day, may, ate, baby, take," or imaginary words which Joan invents for herself. Her ability to reproduce many of these sounds upon request has been the basis for much of such word construction. And although meanings are illustrated for the words as often as possible, most of this type of work has progressed under the impetus of Joan's genuine delight in the mental stimulus she derives from these "conversations" and the social contact and approval earned by successful performance.

Joan's eagerness to vocalize increases constantly, and recently she has tried to reproduce anything she encounters, frequently with the most preposterous results. Even complete sentences no longer thwart her, and familiar ones she reproduces with amazing accuracy as to tempo, pitch, and inflection, using, however, only a single vowel sound (usually "ah") in copying the pattern. This healthy tendency is being enthusiastically encouraged by all her associates, and Joan is wholly cheerful when challenged by some new obstacle the nature of which she can grasp. And yet in spite of her attitude, words "come hard" and are remembered from day to day only after considerable repetition, and only when they have some active meaning in her life. Most words are, of necessity, merely transient "language drills," although some (among them "swing," "rock," "walk," and "stop") seem to be permanently recognized and understood.

Thus far, Joan's comprehension of language is on the level of short phrases and simple commands of which she has learned quite a number. The rhythmic pattern and variability of sounds are more discernible in the larger sentence than in the more compact word form, and so Joan has found the former unit the easier to recognize and retain. Early in February, when the experimenters first began working with phrases, Joan learned, in two weeks, the first four commands given her. These commands ("Clap your hands," "Turn your head around," "Raise your arms high in the air," and "Nod your head") were chosen because of their emphasis on simple physical activity which could be easily understood and accomplished. The experimenters let Joan feel the sentence, "Clap your hands," on the Phonotactor, and then her hands were clapped—or her arms raised in the air, as the case might be. It took Joan several days to grasp the new concept of "vibration pattern action," but as soon as she had discovered what was expected of her she learned to carry out the instructions independently and accurately with unexpected rapidity. Other phrases followed, until there is now a list of about twenty. Included are positive responses to:

"Get up," "sit down," and "come here;"
"Turn around";
"Jump up and down";
"Not so fast";
"Take your fingers out of your mouth" (usually only the first three or four words are necessary);
"All through" or "that's all";
"Are you hungry?";
"Do you want to go for a walk?" (The response for the two questions is chiefly laughter and an expectancy-attitude, for she enjoys both activities; sometimes, when asked if she is hungry she will also open her mouth.)

In the learning of words and phrases, the quality of home training and the amount of attention given her throughout the day are largely responsible for Joan's progress. Mrs. Larsen has steadily and patiently named for Joan the parts of her body, the articles of clothing as she is being dressed, the food she is fed, not once but many, many times over. In this way, Joan learns that Mrs. Larsen is "Tying your shoe-lace," "Combing your hair," or "Washing your hands—your face"; and the child has grown so accustomed to these explanations that she invariably reaches for Mrs. Larsen's throat upon all possible occasions, and sometimes even rebels against comb or soap until they have been named.

At mealtime, for example, it is Joan's habit to wait until each mouthful is named and she has been told "All right" or "Go ahead" before she reaches for her spoon. Furthermore, as a result of this home instruction (which reaches many more and more vital realms of her life than the experimental work could possibly contact), Joan is learning many of her words. "Cookie" is one of them, which she repeats for every bite; and "milk" another, whereupon her two hands come forward and meet in readiness for holding the glass. Frequently, the words for things which she does in the morning form one basis for activities of the experimenters in the afternoon; or, sounds which they hope to have preserved over night are repeated throughout the evening and next morning by Mrs. Larsen.

One of the immediate interests of those working with Joan is to help her discover that she can realize a desire by giving it vocal expression. Until now, although she knows the word 'cookie' and will repeat it for each mouthful, she has not yet asked for a cookie spontaneously. The same situation exists for rocking, swinging, drinking milk, and doing other things for which she knows the words and can reproduce them so that they are recognizable. It may be that she has already tried this and failed to obtain results either because of faulty pronunciation or because her words were mistaken as mere prattle. Another handicap lies in the fact that Joan could observe none of the activity that would follow her request, and there would be a time interval involved which, to the child, would probably represent either forgetfulness or failure. On the other hand, it has been suggested that Joan may not know herself what she wants until something has been presented to her and she has had the opportunity of accepting it or rejecting it. It may be that she has not yet penetrated the meaning of vocal communication to the point where she can employ it in accomplishing her own purposes.

Perhaps this seems a simple step, but it is difficult for the normal individual to perceive the implications in the fact that Joan could have very little idea of the relationship between a cookie and a person, or between either of those and a kitchen, whatever that might be. She has not yet learned to think in terms of units of use because her experience in controlling environmental units is singularly limited. Hence, another responsibility which must be undertaken in the near future is that of developing ways in which Joan can use objects in her environment, and thus increase her knowledge of the world through familiarity with the ways in which it functions and with the interrelationships of its various parts.

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